REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changes to sections 1.3 and 1.4. Technical changes to table I. Changes to figure 3 switching waveforms. Changes to table II. Editorial changes throughout.	89-08-03	W. Heckman
B	Add vendor CAGE 01295. Add device type 02. Change clamp diode current for 1.3. Editorial changes throughout.	94-03-18	M. L. Poelking

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

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REV STATUS OF SHEETS															
REV	B	B	B	B	B	B	B	B	B	B	B	B			
SHEET	1	2	3	4	5	6	7	8	9	10	11	12			

PMIC N/A

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DRAWING APPROVAL DATE
1987 JULY 27

REVISION LEVEL
B

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

MICROCIRCUIT, DIGITAL, ADVANCED CMOS, QUAD, 2-INPUT OR GATE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**67268**	**5962-87614**

SHEET 1 OF 12

DESC FORM 193
JUL 91

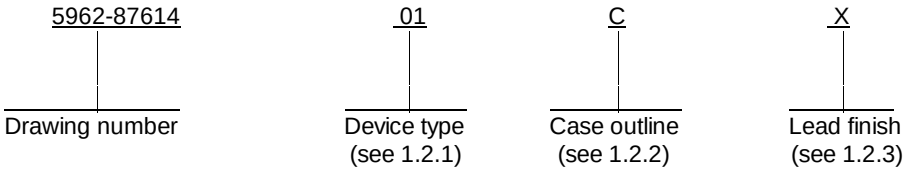
5962-E171-94

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:



1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	54AC32	Quad 2-input OR gate
02	54AC11032	Quad 2-input OR gate

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line package
D	GDFP1-F14 or CDFP2-F14	14	Flat package
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line package
2	CQCC1-N20	20	Square chip carrier package.

1.2.3 Lead finish. The lead finish shall be as specified in MIL-STD-883 (see 3.1 herein). Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings.

Supply voltage range 1/ . . . . . -0.5 V dc to +6.0 V dc
DC input voltage 1/ . . . . . -0.5 V dc to V_{CC} +0.5 V dc
DC output voltage 1/ . . . . . -0.5 V dc to V_{CC} +0.5 V dc
Input clamp diode current . . . . . ±20 mA
Output clamp diode current (device type 01) . . . . . ±20 mA
Output clamp diode current (device type 02) . . . . . ±50 mA
DC output current . . . . . ±50 mA
DC V_{CC} or GND current (per pin) . . . . . ±100 mA 2/
Storage temperature range . . . . . -65°C to +150°C
Maximum power dissipation (P_D) . . . . . 500 mW
Lead temperature (soldering, 10 seconds) . . . . . +260°C
Thermal resistance, junction-to-case (Θ_{JC}) . . . . . See MIL-M-38510, appendix C
Junction temperature (T_J) 3/ . . . . . +175°C

1/ Unless otherwise specified, all voltages are referenced to GND.
2/ For packages with multiple V_{CC} or GND pins, this value represents the maximum total current flowing into or out of all V_{CC} or GND pins.
3/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with method 5004 of MIL-STD-883.

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) 1/ . . . . . 3.0 V dc to 5.5 V dc
Input voltage . . . . . 0.0 V dc to V_{CC}
Output voltage . . . . . 0.0 V dc to V_{CC}
Case operating temperature range (T_C) . . . . . -55°C to +125°C
Input rise or fall times:
V_{CC} = 3.6 V . . . . . 0 to 8 ns
V_{CC} = 5.5 V . . . . . 0 to 8 ns

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and bulletin. Unless otherwise specified, the following specification, standards, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-I-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standards, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-I-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-I-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-I-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-STD-883 (see 3.1 herein) and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections and logic diagram. The terminal connections and logic diagram shall be as specified on figure 1.

1/ Operation from 2.0 V dc to 3.0 V dc is provided for compatibility with data retention and battery backup systems. Data retention implies no input transitions and no stored data loss with the following conditions: $V_{IH} \geq 70$ percent V_{CC}, $V_{IL} \leq 30$ percent V_{CC}, $V_{OH} \geq 70$ percent V_{CC} at -20 µA, $V_{OL} \leq 30$ percent V_{CC} at 20 µA.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

3.2.4 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 3.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full (case or ambient) operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

TABLE I. Electrical performance characteristics.

Test	Symbol	Test conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
High level output voltage 1/	V_{OH}	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -50$ µA	$V_{CC} = 3.0$ V	All	1, 2, 3	2.9		V
			$V_{CC} = 4.5$ V			4.4		
			$V_{CC} = 5.5$ V			5.4		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -4$ mA	$V_{CC} = 3.0$ V			2.4		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -24$ mA	$V_{CC} = 4.5$ V			3.7		
			$V_{CC} = 5.5$ V			4.7		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -50$ mA	$V_{CC} = 5.5$ V	01	1, 2, 3	3.85		
				02	2, 3	3.85		
Low level output voltage 1/	V_{OL}	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 50$ µA	$V_{CC} = 3.0$ V	All	1, 2, 3		0.1	V
			$V_{CC} = 4.5$ V				0.1	
			$V_{CC} = 5.5$ V				0.1	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 12$ mA	$V_{CC} = 3.0$ V				0.5	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 24$ mA	$V_{CC} = 4.5$ V				0.5	
			$V_{CC} = 5.5$ V				0.5	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 50$ mA	$V_{CC} = 5.5$ V	01	1, 2, 3		1.65	
				02	2, 3		1.65	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Test conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
High level input voltage 2/	V_{IH}		V_{CC} = 3.0 V	All	1, 2, 3	2.1		V
			V_{CC} = 4.5 V			3.15		
			V_{CC} = 5.5 V			3.85		
Low level input voltage 2/	V_{IL}		V_{CC} = 3.0 V		1, 2, 3		0.9	V
			V_{CC} = 4.5 V				1.35	
			V_{CC} = 5.5 V				1.65	
Input leakage current	I_{IL}	V_{IN} = 0.0 V	V_{CC} = 5.5 V		1, 2, 3		-1.0	µA
	I_{IH}	V_{IN} = 5.5 V					1.0	
Quiescent current	I_{CCH}	$V_{IN} = V_{CC}$ or GND V_{CC} = 5.5 V			1, 2, 3		80	µA
	I_{CCL}						80	
Input capacitance	C_{IN}	See 4.3.1c			4		8.0	pF
Power dissipation capacitance 3/	C_{PD}	See 4.3.1c			4		35	pF
Functional tests		Tested at V_{CC} = 3.0 V and repeated at V_{CC} = 5.5 V, See 4.3.1d			7, 8			

See footnotes at end of table.

TABLE I. Electrical performance characteristics.

Test	Symbol	Test conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device type	Group A subgroups	Limits		Unit
						Min	Max	
Propagation delay time, A, B to Y 4/	t_{PHL1}	C_L = 50 pF R_L = 500Ω See figure 3	V_{CC} = 3.0 V	All	9	1.0	9.5	ns
			V_{CC} = 4.5 V			1.0	7.5	
	t_{PLH1}		V_{CC} = 3.0 V			1.0	10.0	
			V_{CC} = 4.5 V			1.0	7.5	
	t_{PHL1}	C_L = 50 pF R_L = 500Ω See figure 3	V_{CC} = 3.0 V		10, 11	1.0	11.5	ns
			V_{CC} = 4.5 V			1.0	8.5	
	t_{PLH1}		V_{CC} = 3.0 V			1.0	12.0	
			V_{CC} = 4.5 V			1.0	9.0	

1/ V_{OH} and V_{OL} tests will be tested at V_{CC} = 3.0 V and V_{CC} = 4.5 V. V_{CC} = 5.5 V will be guaranteed, if not tested. Limits shown apply to operation at V_{CC} = 3.3 V ±0.3 V and V_{CC} = 5.0 V ±0.5 V. Transmission driving tests are performed at V_{CC} = 5.5 V with a 2 ms duration maximum.

2/ The V_{IH} and V_{IL} tests are not required and shall be applied as forcing functions for the V_{OH} and V_{OL} tests.

3/ Power dissipation capacitance (C_{PD}), determines the dynamic power consumption, $P_D = (C_{PD} \times C_L) \times V_{CC}^2 \times f \times I_{CC} \times V_{CC}$, and the dynamic current consumption (I_S) is, $I_S = (C_{PD} \times C_L) \times V_{CC} \times f \times I_{CC}$.

4/ AC limits at V_{CC} = 5.5 V are equal to limits at V_{CC} = 4.5 V and guaranteed by testing at V_{CC} = 4.5 V. Minimum ac limits for V_{CC} = 5.5 V shall be guaranteed by guardbanding V_{CC} = 4.5 V limits to 1.5 ns (minimum).

Device types	01		02	
Case outlines	C and D	2	E	2
Terminal number	Terminal symbol			
1	1A	NC	1A	NC
2	1B	1A	1Y	V_{CC}
3	1Y	1B	2Y	2B
4	2A	1Y	GND	2A
5	2B	NC	GND	1B
6	2Y	2A	3Y	NC
7	GND	NC	4Y	1A
8	3Y	2B	4B	1Y
9	3A	2Y	4A	2Y
10	3B	GND	3B	GND
11	4Y	NC	3A	NC
12	4A	3Y	V_{CC}	GND
13	4B	3A	V_{CC}	3Y
14	V_{CC}	3B	2B	4Y
15	---	NC	2A	4B
16	---	4Y	1B	NC
17	---	NC	---	4A
18	---	4A	---	3B
19	---	4B	---	3A
20	---	V_{CC}	---	V_{CC}

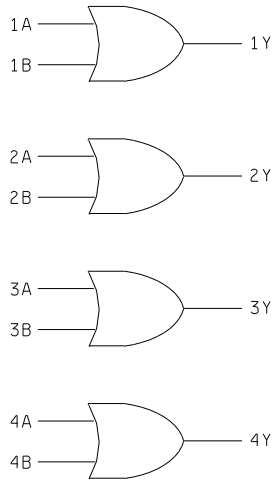
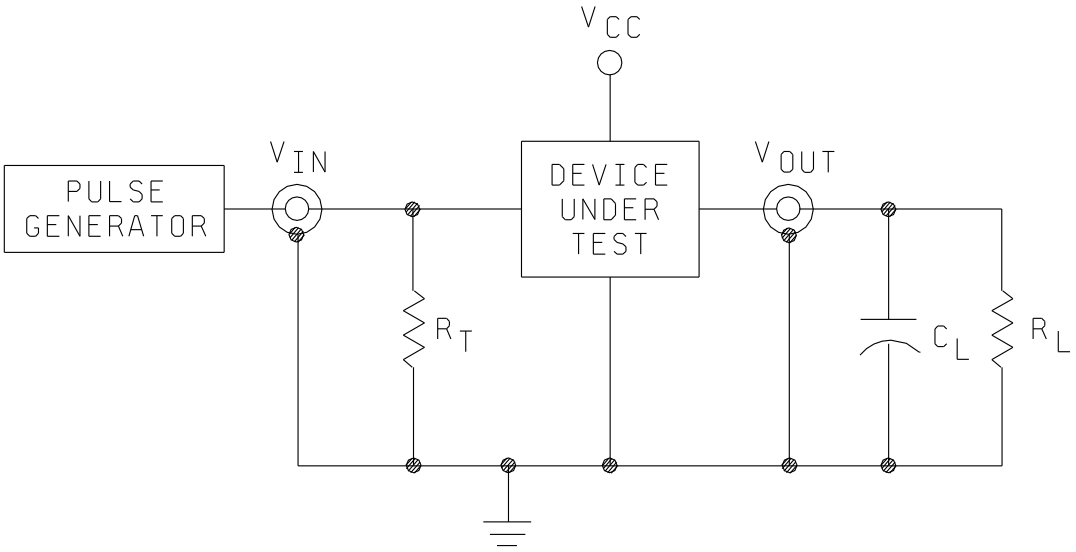


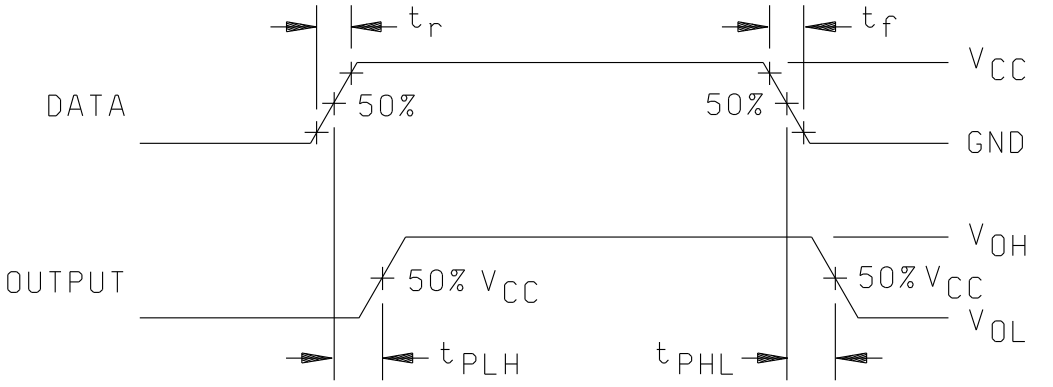
FIGURE 1. Terminal connections and logic diagram.

Truth table (each gate)		
Inputs		Output
A	B	Y
L	L	L
H	L	H
L	H	H
H	H	H

H = High voltage level
L = Low voltage level

FIGURE 2. Truth table.





NOTES:
1. $t_r = t_f = 3.0$ ns 10% to 90% or equivalent.
2. $R_L = 500\Omega$, $C_L = 50$ pF, $R_T \approx 50\Omega$.
3. C_L includes probe and jig capacitance.

FIGURE 3. Test circuit and switching waveforms.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} and C_{PD} measurements) shall be measured only for the initial test and after process or design changes which may affect input capacitance.

d. Subgroups 7 and 8 shall include verification of the truth table as specified on figure 2 herein.

4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-STD-883 (see 3.1 herein).

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal .

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444-5270, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 94-03-18

Approved sources of supply for SMD 5962-87614 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-EC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN 1/	Replacement military specification PIN
5962-8761401CX	27014	54AC32DMQB	M38510/75201BCX
5962-8761401DX	27014	54AC32FMQB	M38510/75201BDX
5962-87614012X	27014	54AC32LMQB	M38510/75201B2X
5962-8761402EX	01295	SNJ54AC11032J	
5962-87614022X	01295	SNJ54AC11032FK	

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
01295	Texas Instruments Incorporated 13500 North Central Expressway P.O. Box 655303 Dallas, TX 75265 Point of contact: I-20 at FM 1788 Midland, TX 79711-0448
27014	National Semiconductor 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, CA 95052-8090 Point-of-contact: 333 Western Avenue South Portland, ME 04106-1718